FORESTERMAGAZINES

Waste

From the June-2016 Issue

Los Angeles County Net Greenhouse Gas Comparison Study

This analysis compares the net greenhouse gas emissions of two scenarios.

Coby Skye • May 20, 2016

The first scenario is the transport and disposal of 1,000 tons per day (tpd) of residuals from a mixed waste materials recovery facility (MRF) to a modern sanitary landfill (Baseline Scenario).

The second scenario proposes to process the same residuals at an Integrated MRF with conversion technologies (Alternative Scenario).

The Baseline Scenario results in a net increase of approximately 1.64 million metric tons of carbon dioxide equivalent (MTCO2E), while the Alternative Scenario results in net avoided GHG emissions of (0.67) million MTCO2E. So, shifting from the Baseline Scenario to the Alternative Scenario would result in a total GHG reduction of approximately 2.31 million MTCO2E. The study parameters were strictly focused on analysis of GHG emissions and other air pollutants and do not consider other environmental, social, or economic parameters.

In both scenarios, cumulative GHG emissions were analyzed for handling 1,000 tpd of post-recycled residuals (i.e., after recycling efforts) from a mixed waste MRF over a period of 25 years.

For the Baseline Scenario, GHG emissions were modeled for a 100-year period after the landfill ceased to accept waste to account for GHG emissions generated by the decomposition of the waste disposed in the landfill.

The models used in the analysis to estimate GHG emissions from transportation and landfill operations are developed

by air districts throughout California and consider future truck fleets with better emissions controls such as alternative fuels. The Baseline Scenario also assumes a soil cover (or cap) for the refuse and landfill gas (LFG)-to-energy, which is common of landfills in southern California.

Under the Alternative Scenario, the post-recycled residuals from a mixed waste MRF are assumed to be further processed in an Integrated MRF with Conversion Technologies over a 25-year period, after which the facility is assumed to cease operating. The Integrated MRF with Conversion Technologies assumed in this study is modeled after a combination of technologies employed elsewhere in the world, including mechanical pre-processing to recover additional recyclable material and to separate residuals into a wet fraction for anaerobic digestion and composting, and a dry fraction for thermal gasification. These facility components and practices reflect actual modern, commercial scale operating mechanical pre-processing and anaerobic digestion facilities in the European Union, and thermal gasification and ash melting facilities in Asia.

In order to model emissions from a facility in California, the latest available statewide postrecycled MRF residual waste composition data (at the time of the analysis) from CalRecycle was assumed as the feedstock for the analysis. The Alternative Scenario also accounts for transport and disposal of the Integrated MRF with Conversion Technologies residuals to landfill, assuming a landfill with a cap and flare (due to residuals having very low organic content and thus low landfill gas generation from those residuals not sufficient for LFG-to-energy).

The net GHG emissions results calculated in this study are based on non-biogenic emissions (i.e., fugitive methane emissions from landfills and emissions from combustion of fossil fuels) pursuant to the Intergovernmental Panel on Climate Change (IPCC) guidelines, and industry-accepted GHG models such as EPA Waste Reduction Model (WARM), European Union's EpE model, and California Air Resources Board models. Biogenic emissions are not included in these conclusions, as these emissions naturally cycle through the atmosphere by processes such as photosynthesis, and are therefore carbon neutral and do not impact GHG emissions.

The analysis compares the overall net GHG emissions for the two scenarios measured in terms of MTCO2E for 1,000 tpd of post-recycled MRF residuals. The Baseline Scenario results in net GHG emissions of approximately 1.64 million MTCO2E, over a 125-year period taking into account continued GHG emissions from waste decomposition in the landfill, which is comparable to 340,000 passenger vehicles driven for one year. The Alternative Scenario results in net avoided GHG emissions of (0.67) million MTCO2E over a 25-year period, which is comparable to 140,000 fewer passenger vehicles driven for one year.

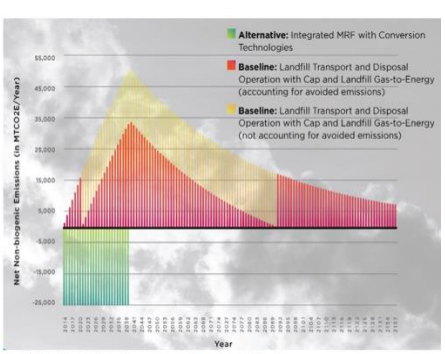

Figure 3. Net non-biogenic GHG emissions over time: Baseline vs. Alternative Scenario

The two scenarios evaluated emissions from transportation, operation, and avoided emissions. The most significant difference between the two scenarios is that the avoided emissions are much greater for the Alternative Scenario. This is due to the energy generated from anaerobic digestion and gasification, which would replace fossil fuels, as well as the additional integrated MRF recycling in the Alternative

Scenario. Avoided emissions in the Baseline Scenario are due to LFG-to-energy replacing the use of fossil fuels.

The avoided emissions in the Baseline Scenario are due to LFG-to-energy replacing the use of fossil fuels during the time period that enough landfill gas is generated to support an LFG-to-energy facility. The net annual GHG emissions results (after accounting for avoided emissions) associated with the management of waste materials for the Baseline and Alternative Scenarios is graphically shown in Figure 3. MSW_bug_web